

---

## PART I - ADMINISTRATIVE

### Section 1. General administrative information

Title of project

Streamnet: The Northwest Aquatic Information System

---

BPA project number: 8810804

Contract renewal date (mm/yyyy): 10/1999

☐ Multiple actions?

Business name of agency, institution or organization requesting funding

Pacific States Marine Fisheries Commission

---

Business acronym (if appropriate)

PSMFC

---

Proposal contact person or principal investigator:

Name Drew O. Parkin

Mailing Address 45 S.E. 82nd Drive, Suite 100

City, ST Zip Gladstone, OR 97027-2522

Phone (503) 650-5400

Fax (503) 650-5426

Email address Drew\_Parkin@psmfc.org

NPPC Program Measure Number(s) which this project addresses

Primary: Sections 3.2 and 3.3 as follows: 3.2A.1, 3.2A.2, 3.2B.1, 3.2F.1, 3.2G.2, 3.3A.1, 3.3A.2, 3.3B.1, 3.3 C.1, 3.3D.1, 3.3 E.1

Additional: 2.2A, 2.2D, 4.3C.1, 5.0F.15, 7.0C.2, 7.1C1, 7.1C2, 7.1C3, 7.6D, 8.1, 8.5E.1

---

FWS/NMFS Biological Opinion Number(s) which this project addresses

StreamNet provides data and data services to a variety of Columbia Basin ESA-related activities including the draft Snake River Salmon Recovery Plan, the Oregon Plan, the Idaho Bull Trout Plan, and the Washington Wild Salmonid Policy.

---

Other planning document references

draft Snake River Salmon Recovery Plan: 0.3.a, 0.3.b, 0.3.d, 1.1.a, 1.1.b.3, 1.2.a, 1.4.a, 1.5.b, 1.6.a, 2.1.d.5, 4.2.d.

Wy Kan Ush Me Wa Kush Wit: pages 5A-4, 5B-5, 5D-1, 5D-2, 5D-3, volume 2 (subbasin plans).

ISG Return to the River (page numbers refer to prepublication version): pages 353, 425, 426, 429, 430, 431, 443, 444, 445, 449, 511, 518.

USFS/BLM Interior Columbia Basin Ecosystem Management Project: Assessment of Ecosystem Components: pages 2056, 2057.

CBFWA AIWP Recommendations, June 1997: 5.5.1.1, 5.5.2, 5.5.2.1, 5.9.4-1, 5.11.3.1, 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.4.5, 6.4.6, 6.4.7, 7.4.2, 8.3.1, 8.3.2, 8.3.3, also: Appendix A, June 1997: 2.2.3, 2.4.3, 2.5.1.4, 2.7.1, 2.7.2.

ISRP July 1997 Program Review: III.A.1, III.A.4, III.B.7, III.B.13, III.B.14, III.B.15, III.B.20.

---

NWPPC AIWP Recommendations, 1997: 4.b, 9.a, 9.b.

NWPPC AIWP Recommendations, 1998: 5a,b; 18b

ISRP July 1998 Program Review: III-B (resident fish), V-C.1.1, V-C.1.2V-C.1.3, V-C.3.1, V-C.5.3.

---

**Short description**

Provide essential data services to the Fish & Wildlife Program including: 1) regionally consistent biological data, 2) access to data and documents via the Internet, Library, and custom products, and 3) technical support to projects and activities.

---

**Target species**

chinook, sockeye, coho, steelhead, bull trout, cutthroat

---

## Section 2. Sorting and evaluation

**Subbasin**

Systemwide - Data will be compiled for all Columbia River subbasins.

---

**Evaluation Process Sort**

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input checked="" type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

Project #	Project title/description
	none - StreamNet maintains close working relationships with other FWP
	data project (e.g., Fish Passage Center, Coded Wire Tag, PIT tag) to ensure
	compatibility and avoid duplication.

***Other dependent or critically-related projects***

Project #	Project title/description	Nature of relationship
8906200	CBFWA - Prepare Draft Annual Implementation Work Plan	StreamNet will provide data and data services in support of CBFWA objects #1 (draft AIWP), #4 (regional research, monitoring, & evaluation plan), #5 (tracking of non-FWP restoration activities and budgets), and #6 (status of fish & wildlife

		populations).
9700400	Kalispel Tribe - Resident Fish Status Above Chief Joseph & Grand Coulee	StreamNet will provide data exchange protocol and technical support, integrates products with basin-wide datasets.
5502000	IDFG - Snake River Native Salmonid Assessment	StreamNet will provide data exchange protocol and technical support, integrates data with basin-wide datasets.
8812001	Yakima/Klickitat Fisheries Project	StreamNet will provide Internet access to applicable data prepared through this and other YIN-sponsored projects.
9132	Implement Wy-Kan-Ush-Mi Wa-Kish-Wit Watershed Restoration Plan	StreamNet will provide baseline data, data exchange protocol, and technical GIS assistance; and will integrate applicable data into basin-wide datasets.
	Misc. Fish and Wildlife Projects	Several FY 99 projects propose to use StreamNet as the principal means to provide Internet access to project data and results.

## Section 4. Objectives, tasks and schedules

### *Past accomplishments*

Year	Accomplishment	Met biological objectives?
1998	StreamNet successfully added recent and/or current year data to all anadromous fish escapement trends.	Met project objective. (Note: StreamNet supports other projects in meeting biological objectives but does not - in-and-of itself - achieve biological objectives.)
1998	StreamNet released the initial version of an Internet-based, Basin-wide project tracking system and made significant progree toward establishment of multi-agency data exchange standards for compiling enhancement project data.	Met project objective.
1998	StreamNet prepared and updated an online version of the annual FWP AIWP process. The product has proven to be extremely useful to FWP managers and decision makers.	Met project objective.
1998	StreamNet completed a first-ever regionally consistent hydrographic data layer, established lat-long identification protocol, and populated the system with regionally consistent anadromous fish distribution and use type data.	Met project objective.
1998	StreamNet produced a comprehensive online data query system that provides custom, user-defined remote access to all StreamNet data.	Met project objective.
1998	StreamNet produced a major update to its regional data exchange formats document, including new entries for project tracking and fish distribution. Significant improvements were also made to geographic location standards.	Met project objective.

### Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Basin-wide Data Development	a	Anadromous fish. Prepare and maintain regionally consistent data including distribution and life history, adult abundance, juvenile abundance, harvest, hatchery production, natural production, age/sex composition, genetics, and populations.
		b	Resident fish. Prepare and maintain regionally consistent data including distribution and life history, adult abundance, angler use, hatchery production, genetics, population, and status.
		c	Aquatic Habitat. Compile regionally consistent data including stream surveys, water quality, water quantity, and watershed parameters (ICBEMP and other existing sources).
		d	Facilities. Prepare and maintain regionally consistent data on dams, fish passage facilities, hatcheries, and, as available, diversions and screenings.
		e	Mitigation and Restoration. Prepare and maintain regionally consistent data on fish and wildlife restoration and protection projects undertaken through the Fish and Wildlife Program, Federal MOA, Endangered Species Act, and other activities.
2	Data Management	a	Database Management. Maintain and update the StreamNet database.
		b	Data Plan. Review the StreamNet long-term data plan in light of regional needs and update accordingly.
		c	Data Exchange Standards. Maintain and update the StreamNet data exchange standards in light of emerging regional needs.
		d	GIS Data System. Maintain and update StreamNet GIS datasets to be responsive to regional needs.
		e	Internet Site. Maintain and enhance the StreamNet Internet site, including providing access to StreamNet data and other information critical to the Fish and Wildlife Program.
		f	Hydrologic/geographic Referencing. Maintain the 1:100,000-scale hydrography and a regionally consistent watershed, subbasin, and physiographic province referencing system, including providing means for integrating FWP-generated data with this system.

3	Library and Reference Services	a	Documents. Maintain and expand the StreamNet Library document collection, including cataloging and indexing materials.
		b	Data Source Materials. Maintain and update StreamNet data source materials including providing online referencing.
		c	Online Access. Provide online access to important reference materials and reports related to Columbia Basin fish biology and management.
		d	Library Services. Provide professional library services to the Columbia Basin FWP community, including document search, inter-library loans, and access to the Streamnet collection.
4	Services to Fish and Wildlife Program Activities.	a	AIWP. Provide technical assistance in preparing a database that tracks the annual AIWP process. Prepare an Internet version of the database that depicts each stage of the AIWP process and provides access to appropriate documents (CBFWA objective #1).
		b	Monitoring and Evaluation. Provide technical assistance regarding development of an M&E plan; provide data services for M&E analyses and reports (CBFWA objectives #4 and #6).
		c	Watershed Projects. Provide technical database and GIS services to watershed projects and system-wide watershed project evaluation. Integrate data from these projects into regional datasets.
		d	FWP Projects. Provide technical assistance to select research, stock assessment, and other FWP projects. Integrate data from these projects into regional datasets.
		e	System-wide Initiatives. Provide technical assistance to FWP system-wide initiatives (priorities defined by NWPPC and CBFWA).
		f	Internet Access. Provide Internet access for applicable FWP-related data and documents (in consultation with NWPPC and CBFWA).
		g	Historic Policy and Planning Data. Maintain and provide access to historic FWP datasets and documents, e.g., Protected Areas and System Planning.
5	Project Coordination	a	Administration. Supervise and coordinate StreamNet project activities and the regional and sub-contractor levels.
		b	Coordination. Coordinate StreamNet activities with other FWP, ESA, and related activities.

### **Objective schedules and costs**

<b>Obj #</b>	<b>Start date mm/yyyy</b>	<b>End date mm/yyyy</b>	<b>Measureable biological objective(s)</b>	<b>Milestone</b>	<b>FY2000 Cost %</b>
1	10/1999	9/2000	Compile and update biological and project all data as described in the FY2000 statement of work and within the schedule defined in the annual StreamNet data plan.	Milestones for deliverables will be established at the beginning of the contract period and will vary by data category.	.52
2	10/1999	9/2000	Integrate all data compiled in objective #1 into the StreamNet data system in a timely manner. Adapt the StreamNet online query system to accomodate all data provided through objective #1.	All data will be incorporated into the StreamNet datasets within one month of submission.	.14
3	10/1999	9/2000	Catalog and index all source materials used to compile data in objective #1. Provide timely response to all FWP-related library service requests.	Source documents will be catalogued and indexed within one month of submission. Library requests will receive a response within 24 hours.	.12
4	10/1999	9/2000	Provide timely and effective data services to high priority FWP-related activities where these could not otherwise be provided.	All data requests will receive an initial response within 24 hours. Larger requests will be delivered within an agreed upon timeframe.	.18
5	10/1999	9/2000	Provide effective leadership to project participants and ensure that StreamNet data and data services respond to high priority regional needs.	All project tasks will be completed on time and within budget. FWP clients will be contacted following service delivery to evaluate performance.	.04
				<b>Total</b>	100.00%

#### **Schedule constraints**

StreamNet compiles data from a variety of sources. Delays in data development and/or verification by these sources may force alteration of schedule. Unforeseen demand for data services may also require adjustments to project priorities.

#### **Completion date**

It is anticipated that data development (especially for biological trends and project tracking), data delivery, and technical services will continue to be needed into the foreseeable future.

## Section 5. Budget

**FY99 project budget (BPA obligated):** \$1,883,630

### ***FY2000 budget by line item***

<b>Item</b>	<b>Note</b>	<b>% of total</b>	<b>FY2000</b>
Personnel	PSMFC staff (project manager, database manager, GIS manager, programmer, data technician)	% 11	206,000
Fringe benefits	@ 37%	% 4	76,220
Supplies, materials, non-expendable property	Includes Internet connections, computer system support, office supplies, limited computer upgrades.	% 3	60,000
Operations & maintenance		% 0	0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		% 0	0
NEPA costs		% 0	0
Construction-related support		% 0	0
PIT tags	# of tags:	% 0	0
Travel		% 1	16,000
Indirect costs	@ 15%	% 3	53,733
Subcontractor	CRITFC (tribal coordination and data management, library management)	% 18	345,000
Subcontractor	IDFG	% 12	235,000
Subcontractor	MFWP	% 8	150,000
Subcontractor	Nez Perce Tribe	% 1	26,000
Subcontractor	ODFW	% 16	310,000
Subcontractor	Shoshone-Bannock Tribes	% 1	26,000
Subcontractor	Umatilla Tribe	% 1	26,000
Subcontractor	USFWS	% 1	15,000
Subcontractor	Warm Springs Tribe	% 1	26,000
Subcontractor	WDFW	% 16	310,000
Subcontractor	Yakama Indian Nation	% 1	26,000
Other	PSMFC administration of sub-contracts	% 2	29,500
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$1,936,453</b>

### ***Cost sharing***

<b>Organization</b>	<b>Item or service provided</b>	<b>% total project cost (incl. BPA)</b>	<b>Amount (\$)</b>
National Marine Fisheries Commission	Contract for coastal anadromous trend data comparable to in-Basin data (estimated).	% 3	75,000
Environmental Protection Agency	Contract for compilation of related aquatic habitat and hydrological data (estimated).	% 3	75,000
National Marine Fisheries Service and/or others	Contract for compilation of non-FWP enhancement project data (estimated).	% 3	75,000
Participating Agencies	In-kind services and data (based on	% 6	150,000

	prior experience).		
<b>Total project cost (including BPA portion)</b>			\$2,311,453

### ***Outyear costs***

	<b>FY2001</b>	<b>FY02</b>	<b>FY03</b>	<b>FY04</b>
<b>Total budget</b>	\$1,984,864	\$2,034,485	\$2,085,348	\$2,137,481

## **Section 6. References**

<b>Watershed?</b>	<b>Reference</b>
<input type="checkbox"/>	Agencies and Indian Tribes of the Columbia Basin Fish and Wildlife Authority. 1991. Integrated System Plan for Salmon and Steelhead Production in the Columbia River Basin. Columbia Basin Fish and Wildlife Authority, Portland, Oregon.
<input type="checkbox"/>	Anderson, D, R. Beamesderfer, B. Woodard, M. Rowe, and J. Hansen. 1996. Report on the Status of Salmon and Steelhead in the Columbia River Basin. DOE/BP-65130-1, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Bonneville Power Administration. 1992. Stock Summary Reports. Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Columbia Basin Fish and Wildlife Authority. 1998. Proposed FY 1999 Annual Implementation Work Plan. Columbia Basin Fish and Wildlife Authority, Portland, Oregon.
<input type="checkbox"/>	Columbia Basin Fish and Wildlife Authority. 1997. Proposed FY 1998 Annual Implementation Work Plan (Appendix A). Columbia Basin Fish and Wildlife Authority, Portland, Oregon.
<input type="checkbox"/>	Columbia River Inter-tribal Fish Commission & Member Tribes. 1996. Spirit of the Salmon: Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs & Yakama Tribes. Columbia River Inter-tribal Fish Commission, Portland, Oregon
<input type="checkbox"/>	Fish and Wildlife Managers of the Columbia River Basin. 1997. Multi-Year Implementation Plan for the Protection, Restoration, and Enhancement of Columbia River Basin Fish & Wildlife Resources. Columbia Basin Fish and Wildlife Authority, Portland, Oregon.
<input type="checkbox"/>	Independent Scientific Group. 1996. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem (Prepublication version). Northwest power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Independent Scientific Review Panel. 1997. Review of the Columbia River Basin Fish and Wildlife Program as Directed by the 1996 Amendment to the Power Act. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Independent Scientific Review Panel. 1998. Review of the Columbia River Basin Fish and Wildlife Program as Directed by the 1996 Amendment to the Power Act. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	National Marine Fisheries Service. 1995. Proposed Snake River Salmon Recovery Plan. National Marine Fisheries Service, Washington, DC.
<input type="checkbox"/>	National Research Council. 1996. Upstream: Salmon and Society in the Pacific Northwest. National Academy Press, Washington, DC.
<input type="checkbox"/>	National Research Council. 1995. Science and the Endangered Species Act. National Academy Press, Washington, DC.
<input type="checkbox"/>	Northwest Power Planning Council. 1998. Fiscal Year 1999 Annual Implementation Work Plan Recommendations of the Northwest Power Planning Council. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1997. Fiscal Year 1998 Annual Implementation Work Plan Recommendations of the Northwest Power Planning Council. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1998. An Integrated Framework for Fish and Wildlife Management in the Columbia River Basin. Northwest Power Planning Council Portland,



	Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1994. 1994 Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1987. 1987 Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1984. 1984 Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Northwest Power Planning Council. 1992. Strategy for Salmon. Portland, Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	SNAKE RIVER SALMON RECOVERY TEAM. 1997. Comments on the ISG Return to the River. Letter to John Etchart, Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	State of Idaho. 1996. Bull Trout Conservation Plan. State of Idaho, Boise, Idaho.
<input type="checkbox"/>	State of Oregon. 1997. The Oregon Plan. State of Oregon, Salem, Oregon.
<input type="checkbox"/>	Quigley, Thomas M., and Sylvia J. Arbelbide, editors. 1997. An Assessment of Ecosystem Components in the Interior Columbia Basin. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.
<input type="checkbox"/>	Washington Department of Fish and Wildlife. 1997. Policy of Washington Department of Fish and Wildlife and Western Washington Treaty Tribes Concerning Wild Salmonids. State of Washington, Olympia, Washington.

---

## PART II - NARRATIVE

### Section 7. Abstract

StreamNet seeks to create, maintain, and distribute regionally consistent biological information for use in monitoring Fish and Wildlife Program (FWP) effectiveness and for a variety of other FWP-related purposes. Data are delivered via the Internet and custom products. StreamNet also provides technical assistance and services to a range of FWP activities and projects. The StreamNet Library maintains original source materials for data in the StreamNet system and provides a full range of library services to Columbia River Basin fish and wildlife scientists, managers, and policy makers.

StreamNet is a cooperative venture of the region's fish and wildlife agencies and tribes and serves as a principal vehicle for coordinating data activities among these organizations. Data development targets critical FWP and related data needs. Data categories include anadromous species production and survival trends; anadromous and resident species distribution and life history; aquatic habitat; hatcheries, dams and other facilities; and enhancement/mitigation projects.

In response to ISG and ISRP recommendations, the StreamNet data plan has been revised to include population and genetics, age and sex composition, and additional resident fish and habitat parameters. StreamNet is also increasing its support services for other FWP activities and projects. Services may include technical support, custom products, and data storage and delivery. Service will specifically target CBFWA's FY 2000 objectives, principally in the areas of project tracking and monitoring and evaluation. Services will also be provided to watershed, stock assessment, and research projects, and to systemwide policy and planning initiatives. Other services will include maintaining project records through the StreamNet Library and increased use of the StreamNet Internet site to deliver FWP-related information.

## Section 8. Project description

### a. Technical and/or scientific background

Accurate, readily available biological and management information is critical to the ultimate success of the Fish and Wildlife Program. Information provides: 1) the foundation for scientifically-based action, 2) the basis for educating decision-makers and the public as to the need for action, and 3) the means to evaluate the effects of actions. The issue is not whether information is needed, but rather *what* information is needed, how it should be developed, and how it will be made available. Each of these tenets be addressed in turn. Collectively they provide the rationale for StreamNet and for the continued inclusion of this critical data development activity in the FWP.

**Data Needs.** A central tenet of the Council's FWP is the goal to double Columbia River Basin salmon populations without losing biological diversity (NWPPC, 1992). Measuring progress toward reaching this goal requires data on salmon production and survival. Natural and hatchery production, juvenile abundance, ocean and in-river harvest, hatchery returns, adult abundance, sex and age ratios for returning adults -- all are important factors that need quantification. Measuring progress toward meeting biological objectives further requires that these data factors be compiled over time in order to identify both short and long-term "trends." It is also critical that the sources of these data be documented and that source materials be maintained over the long term. In both the 1987 and 1994 FWP, the Council specifically identified the need for compilation of data related to production and survival and for the creation of an information system to coordinate this activity (NWPPC, 1987, 1994).

Both the 1987 and the 1994 FWP identified additional types of data that should be incorporated into the information system, including, among others, habitat, mitigation projects, and the results of research. In 1996 and 1997, three major reports were released by the scientific community that expanded the scope of the FWP data development effort (NRC, 1996; ISG, 1996; ISRP, 1997), and, from an ESA perspective, the Snake River Salmon Recovery Team made similar data development recommendations (SRSRT, 1997). Collectively, these reports called for a FWP based on what the ISG termed a "normative" ecological foundation. From a management perspective, this means more emphasis on populations, life stages, habitat, watersheds, and coordination of the FWP with other restoration activities. These management needs translate directly to data needs. The StreamNet team has revised its data plan in light of recommendations offered in these reports and other applicable scientific and policy guidance.

**Data Development Strategy.** In addition to identifying the types of data needed, the 1994 FWP also directed that these data be compiled through a coordinated process. The rationale for this was three-fold. First, a coordinated approach would be more efficient, both in terms of time and money. Second, such an approach would help foster a cooperative working relationship among affected agencies and tribes. Third, and perhaps most importantly, a coordinated approach would help to ensure that data would be reported in a consistent fashion in order that needs and results could be more readily compared -- both between projects and across geographic areas. The vital concern here is the establishment and implementation of an agreement among agencies and tribes to share existing data and work

collectively to develop new data, and to compile both existing and new data using regionally consistent data exchange standards and formats.

Over the past year, significant attention has been given to identifying ways that the FWP might be unified around scientific principles. The Council's draft Framework Report (NWPPC, 1997) and CBFWA's draft Multi-year Implementation Plan (CBFWA, 1997) placed significant emphasis on this. Both suggested the need for information systems to support this more holistic and scientific perspective. Programs outside the FWP have also called for a coordinated approach to aquatic data management. The Proposed Snake River Salmon Recovery Plan made specific mention of this in Section 0.3.a, where NMFS, in agreement with a proposal by the Snake River Science Review Team, called for the region to "consolidate regional efforts to develop a coordinated information and data gathering system" (NMFS, 1995). While providing obvious cross-program benefits, a coordinated data system is also likely to provide significant benefits to future Endangered Species Act listing and recovery activities. The National Research Council's evaluation of the relationship between science and the ESA called for a more "structured" approach to ESA evaluations and identified the need for accurate and consistent data as a critical component (NRC, 1995). The need for a coordinated approach to data management was also identified in the ICBEMP (Quigley and Arbelbide, ed., 1997).

**Technological Advances.** Awareness of the increasing need for coordinated approaches to data development comes at a time of major explosion in data technology. Database management systems have become infinitely more powerful and flexible. Geographic information system technology is making similar advances. Database and GIS technologies are beginning to merge, greatly increasing the utility of both. Hydrographic referencing systems are being made available at much higher resolution, and, of course, the Internet has opened up vast new opportunities for transmitting critical biological and management data.

**Summary.** The three factors described above -- data needs, data consistency and coordination, and technological advances -- form the nucleus of the StreamNet project and the rationale for continuing to include it as a component of the FWP regional coordination strategy. StreamNet targets its data development toward meeting explicit FWP needs, including both the core production and survival data that will always be needed to perform FWP-wide monitoring and evaluation, and the emerging need for ecological and managerial data. StreamNet emphasizes consistency in data development, both across geographic areas and across programs. A data system created on this foundation offers significant benefits to research, analysis, watershed and subbasin planning, and education. StreamNet's reliance on emerging database, GIS, and Internet technologies provides a means to package these data in ways that can respond to the needs of a wide spectrum of users and uses. The StreamNet Library and reference system provide a means to ensure that data is referenced and that important reports are available for use by researchers, managers, and policy-makers.

#### **b. Rationale and significance to Regional Programs**

StreamNet and its predecessor project, the Coordinated Information System (CIS), derive their principal guidance from the 1987 and 1994 FWP. The 1987 FWP directed that a "coordinated information system" be established in order to "facilitate effective exchange and dissemination of fisheries data." The Council provided the following guidance:

*“This will entail the coordination of system-wide data collection programs; identification of data collection needs; and the development of standards for data reporting, storage and retrieval. It also will include coordination of the data collection activities of the program, especially those under Section 206(e) (i.e., a hatchery database and a natural production database), with other large-scale efforts, including those conducted by the Pacific Salmon Commission, the Pacific Fishery Management Council, the North Pacific Fishery Management Council, the Pacific Marine Fisheries Commission, and the federal, tribal, and state harvest managers.” (NWPPC, 1987, 206.d.2.C)*

The Coordinated Information System (CIS) was formally established as a project in 1988. In 1991 the Integrated Systems Plan clarified the role of the CIS as follows:

*“[CIS should] facilitate collection of data and development of new data bases so that the information they contain may be used in the monitoring and evaluation of Columbia River stocks... [Information will include] research results from past, ongoing, and future studies on salmonids from the Columbia River and elsewhere. A particularly important part of this information will be results of studies specifically designed to address critical uncertainties. Information on natural and hatchery production will be accessed as will information on ocean and in-river harvest. Finally, the CIS will use information from the BPA’s Project Management Information System, which tracks BPA’s research and enhancement projects.” (CBFWA, 1991)*

The 1994 Program contained numerous references to the CIS as well as data needs related to the CIS. These are referenced in Section 1. The 1994 Program placed particular emphasis on the role of CIS in monitoring and evaluation:

*“The Coordinated Information System is an integral part of the Council’s monitoring and evaluation program. It is essential to the efficient collection and dissemination of information produced as a result of this program. The system also serves to increase the cost-effectiveness of research, monitoring and evaluation by ensuring that information produced by these programs is readily available to the region.” (NWPPC, 1994, 3.3)*

The Council went on to call for:

1. An annual program monitoring report based on CIS information (3.3A.2),
2. Creation of an anadromous fish database that would include data from the 1992 Stock Summary Reports and “other natural, hatchery and systems information” (3.3B.1),
3. A scientific information data base that would include “existing information from fish and wildlife program projects, other regional research efforts, and related national and international anadromous fish research” (3.3C.1),
4. A habitat data base (3.3D), and
5. A project accounting database to track FWP and other restoration activities (3.3E).

The StreamNet data plan and proposed work statement respond directly to the above Program directives. The work statement also seeks to respond to data needs identified in other documents directly associated with the FWP, including the tribes’ Spirit of the Salmon restoration plan (CRITFC, 1996), the draft Snake River Salmon Recovery Plan (NMFS, 1995), Return to the River (ISG, 1996), the draft Multi-year Implementation Plan (Fish and Wildlife Managers, 1997), the Independent Scientific Review Panel report to the Council (ISRP, 1997), Appendix A to the CBFWA’s proposed FY 98 Annual Implementation Work

Plan (CBFWA, 1997), and the Council's FY 98 and 99 Annual Implementation Work Plan Recommendations (NWPPC, 1997, 1998).

In preparation for this proposal, StreamNet staff conducted a detailed review of the above documents in order to identify references to data needs that relate to StreamNet. Correlations were drawn between these sources in order to identify overlaps and differences. Discussions were also held with other data providers -- notably the Fish Passage Center, Coded Wire Tag, and PIT Tag -- to ensure that efforts were not being duplicated. Findings were then compared to the StreamNet data plan and the plan modified to incorporate these data needs. The data plan was then incorporated into the task list included in this proposal. The proposal for technical services to the FWP identified in Objective 4, Services to the Fish and Wildlife Program, also responds directly to needs expressed in these documents. Having completed this exercise, the StreamNet team is confident that the proposed FY 2000 task list represents a thoughtful and focused proposal for meeting essential FWP data and data service needs.

The reader is directed to [www.streamnet.org/2000](http://www.streamnet.org/2000), which presents additional information concerning StreamNet's FY 2000 proposal, including a matrix that depicts the relationship between regional guidance and StreamNet's proposed FY 2000 tasks.

**c. Relationships to other projects**

**Summary.** StreamNet serves a data coordination function within the Fish and Wildlife Program and, therefore, has significant links to a variety of FWP-sponsored projects. Establishing and implementing a more formal long-term working arrangement with other projects is a primary goal. This relationship can help ensure cost-effective data development and access and can also help make project-generated data available for others in a timely and efficient way. Among the services that StreamNet can provide are:

1. Development of consistent data exchange standards, formats, and entry mechanisms,
2. Integration of project data into a regionally consistent dataset,
3. Access to data via the Internet and custom products,
4. Library services through the StreamNet Library,
5. Technical database, GIS, and Internet assistance, and
6. Preparation of custom data products for special applications.

**Relationship to the CBFWA Statement of Work.** StreamNet proposes to focus its data services on supporting CBFWA and CBFWA members in implementing four of the six objectives in CBFWA's FY 2000 statement of work, as follows:

CBFWA Objective 1 (annual AIWP). StreamNet will prepare an online version of the annual AIWP that provides information to managers, reviewer, and the public. The StreamNet product will track projects through each phase of the process and provide applicable access to appropriate background documents.

CBFWA Objective 4 (monitoring and evaluation strategy). StreamNet was established primarily to provide data for monitoring and evaluation. StreamNet will participate in the development of M&E strategies, specifically by identifying opportunities and issues related to use of data for this purpose.

CBFWA Objective 5 (coordination of FWP project with other initiatives). StreamNet will prepare information on current and historic restoration projects (StreamNet task 1e) and provide these data in ways that are meaningful for inter-program project evaluation.

CBFWA Objective 6 (fish and wildlife population response to FWP activities). StreamNet will provide data and analysis regarding fish population and other appropriate trends and will prepare appropriate maps, charts, graphs, and data tables.

**Relationship to Watershed Projects.** Watershed project assistance will be made principally through cooperation with CRITFC's watershed initiative (project #9132). These services may include: 1) providing baseline data to watershed projects, 2) facilitating creation of consistent biological datasets across all watershed projects through data exchange standards, 3) providing technical assistance regarding data development, and 4) providing Internet and library access to watershed project data and reports. The direction for StreamNet involvement in this activity comes from the Council's FY 98 AIWP Recommendations (NWPPC, 1997). Section 2 of that report states "The habitat project evaluation and selection process should include provisions to ensure that StreamNet is used to coordinate, accumulate, store, and make available the relevant watershed information, assessments and projects."

**Stock Assessments.** Stock assessment projects include the upper Columbia and upper Snake resident fish assessments (projects #9700400 and # 5502000). In addition there are several FWP projects that address bull trout. StreamNet can advance consistency in approaches to data collection among these projects, which will, in turn, result in data that are useful for monitoring and evaluation and other Program-wide applications. Note that, in its review of the draft FY 98 AIWP, the ISRP identified the need for a Basin-wide resident fish assessment (ISRP, 1997). The projects referenced above, coupled with data from MFWP and ICBEMP (Quigley, 1997), could serve as the foundation for this evaluation.

**Non-FWP Activities.** The StreamNet data and data delivery system can help facilitate coordination between the FWP and other programs that contribute to the protection and restoration of Pacific Northwest fish and wildlife resources. For example, the Oregon Plan, initiated by that State to restore salmon, makes use of StreamNet data and data systems (State of Oregon, 1997). The Oregon Plan is developing its project tracking system in tandem with StreamNet and will, therefore, be consistent with that of the FWP, thus benefitting both efforts. As the Oregon Plan expands its data development activities, coordination with StreamNet will help to ensure that these data are both compatible with FWP standards and available for FWP purposes. Similar opportunities exist for collaboration with the Idaho Bull Trout Plan and the Washington Wild Fish Policy.

StreamNet maintains an ongoing relationship with the NMFS's ESA activities. NMFS has contracted with PSMFC (using funds outside of the FWP) to compile anadromous fish production and survival data, mostly outside of the Columbia Basin. This arrangement provides significant advantages to the FWP. As one example, data from outside the Basin (coastal CA, OR, and WA and Puget Sound) are being compiled in a format consistent with Columbia Basin data compilation, thus increasing opportunities for comparative analyses. As another, this more fully integrates NMFS ESA activities with those of the FWP.

**The Potential for Duplication of Effort.** In its July 1998 review of the FY 99 AIWP, the ISRP expressed concern that there may be duplication among FWP-funded data projects.

Specifically mentioned were StreamNet, the Fish Passage Center (FPC), and PIT Tag. Other data projects receiving FWP funds include Coded Wire Tag (CWT) and the UW DART. StreamNet is both separate and distinct from these projects. Confusion may have been generated by the fact that StreamNet was listed in the FY 99 AIWP as a “mainstem and systemwide” project. It would, however, be more appropriate to classify StreamNet as a "systemwide" project or a "systemwide and subbasin/watershed" project. StreamNet compiles data throughout the Columbia Basin, with emphasis on stream reaches and hydrologic units. StreamNet does not get involved in mainstem flow and passage data; these are addressed by the FPC. StreamNet has no connection to PIT Tag or DART and does not provide access to these data. StreamNet does provide access to annual release data from CWT that are compatible with the Streamnet system and that would not otherwise be widely available. StreamNet maintains close communications with FPC, CWT, and PIT Tag to ensure compatibility but avoid duplication. The StreamNet web site provides pointers to each of these projects. There are, of course, opportunities for coordination between FWP-sponsored data projects. StreamNet is supportive of such efforts.

**d. Project history** (for ongoing projects)

The FWP’s biological data system (and StreamNet) had its start with the NWPPC-sponsored Hydro Assessment Study (HAS), a component of in the 1984 FWP (NWPPC, 1984, 1200.C.1 and 2). HAS represented the first attempt to create a Basin-wide fish and wildlife data system. Data derived through HAS were the basis for the Council’s 1987 Protected Areas designations, still recognized as one of the FWP’s major accomplishments.

The HAS data system provided the foundation for the Council’s Subbasin Planning initiative (NWPPC, 1987, 205.a and b). This initiative constituted the first effort within the Columbia Basin to systematically and comprehensively categorize anadromous fish production potential for each of the Basin’s subbasins. Also compiled were data on habitat quality and major factors that inhibit fish production. Subbasin Planning data were later integrated into the Integrated Systems Plan (CBFWA, 1991).

The Coordinated Information System (CIS) was established pursuant to a directive in the 1987 FWP (NWPPC, 1987, 206.d.2.C). Using subbasin planning as a departure point, CIS set about compiling anadromous fish datasets, with hatchery production and harvest targeted for early attention. CIS also prepared a variety of foundation reports, including an assessment of fish and wildlife manager data needs. Early CIS efforts culminated in the 1992 Stock Summary reports (BPA, 1992). In 1994, CIS released its Distributed System (DS), a diskette-based anadromous fish data query system. Both the underlying data and the query system were subsequently enhanced, with Windows versions released in 1995 and 1996.

In 1996, CIS was merged with the BPA-sponsored Northwest Environmental Database project and given the name “StreamNet.” This action was taken in part as a cost savings measure, but it also involved recognition of the region’s evolving data needs. A steering committee was formed and charged with project oversight, and a long-term data plan was prepared. That year, StreamNet prepared the Report on the Status of Salmon and Steelhead in the Columbia River Basin (Anderson, *et al.*, 1996), using project datasets as the principal data source, and initiated an Internet-based data delivery system.

In FY 1997, significant energy went into updating anadromous fish datasets, integrating resident fish data into the system, enhancing the 1:100,000 river reach system, and creating a 1:100,000-scale fish distribution data layer. The StreamNet Internet site was significantly enhanced, both in terms of data acquisition and system capabilities. Efforts expanded to target StreamNet data and data services toward meeting specific FWP needs.

In FY 1998 StreamNet moved to a new Internet server system offering greatly enhanced data, map, and library queries. The scope of the StreamNet data plan was expanded to respond to emerging needs. Regionwide andromous fish distribution and use type data were made available and integrated with an enhanced version of the 1:100,000-scale hydrography. In FY 1999 StreamNet provided significant support to several FWP activities, notably watershed planning, the Multi-species Framework, and Artifical Production Review.

#### **Past Costs**

1996	\$1,762,833	1998	\$1,932,455
1997	\$1,932,455	1999	\$1,883,630

#### **Past Project Numbers**

360	Regional Rivers
88-108	Coordinated Information System (CIS)

#### **e. Proposal objectives**

This section presents a summary of the proposed FY 2000 StreamNet work statement. For a list of specific sub-tasks see Section 4.

**Objective 1 - Data Development.** *Increase the knowledge base concerning the region's fish and wildlife resources through the acquisition of new information that responds to emerging needs as well as through the updating and enhancement of anadromous production and survival trends and other existing information.*

Except where noted, the product for each of these tasks will be specific, pre-defined data products compiled using standard exchange formats, integrated into the StreamNet data system, and made available via the StreamNet Internet site.

**Task 1a. Anadromous Fish.** This task focuses on the compilation of annual data related to anadromous fish production and survival. It also includes refinement of species and life stage distribution maps. Newer areas include identifying streams where genetics data are available, compiling known population data, and initiating a strategy for development of detailed, long-term data for specified index populations.

**Task 1b. Resident Fish.** Resident fish data compilation will be similar to that for anadromous species, although data development is not as far advanced. The focus will be on species and life stage distribution. Other areas include population delineation, stocking, and abundance.

**Task 1c. Aquatic Habitat.** Activities will include: 1) incorporating appropriate data from the ICBEMP, 2) updating existing water quality and flow trend data, 3) compiling historic



habitat records as recommended in Return to the River (ISG, 1996, p. 431), and 4) initiating a long-term effort to link field survey data to the StreamNet data system.

**Task 1d. Facilities.** StreamNet will maintain and update existing dam and hatchery data and incorporate available fish passage facility and diversion/screening data.

**Task 1e. Mitigation Projects.** StreamNet will continue efforts to create both a historic and a current restoration project database including FWP, federal MOA, and other state, federal, and private projects.

**Objective 2 - Data Management and Delivery.** *Provide high quality data services, with specific emphasis on the creation of regionally consistent data sets and timely delivery of data to users in formats that meets policy, planning, and management needs.*

Measurable objectives will include: 1) incorporation of all data delivered by participating agencies into the StreamNet, 2) successful completion of all appropriate service requests, and 3) continued increase in use of the StreamNet Internet site for FWP purposes.

**Objective 3 - Library / Reference Services.** *Provide professional library services targeted to meet the needs of the region's fish & wildlife decision-makers, planners, and managers. Continue to acquire and catalog StreamNet data source materials and other critical documents and providing open and efficient access to these materials.*

Measurable objectives will include: 1) cataloging of all StreamNet data system source materials as supplied by participating agencies, 2) successful completion of all appropriate service requests, and 3) continued increase in use of the StreamNet Library.

**Objective 4 - Services to the Fish and Wildlife Program and Related Aquatic Resource Restoration Activities.** *Provide substantive technical data services to FWP decision-makers and appropriate FWP projects.*

**Task 4a. Project Tracking.** StreamNet will incorporate data from task 1e. above into a computerized project tracking system. StreamNet will also prepare custom Internet products that display proposed AIWP projects and array these in a variety of ways that will enable decision-makers to evaluate projects. (Responds to CBFWA objectives 1 and 5.)

**Task 4b. Monitoring and Evaluation.** StreamNet will participate in efforts to create a FWP monitoring and evaluation strategy, paying special attention to how data might be used to support this. StreamNet will also prepare data reports and other custom products in support of species status evaluations. (Responds to CBFWA objectives 4 and 6.)

**Task 4c. Watershed Projects.** StreamNet will provide baseline data and participate in the preparation of watershed project data exchange standards. StreamNet will also provide a means to maintain and access watershed project data.

**Task 4d. Other FWP Projects.** StreamNet will provide data and data services to other selected FWP projects, including stock assessments and applicable research projects.

**Task 4e. System-wide Initiatives.** StreamNet will provide data and data services to selected system-wide planning and policy initiatives. FY 99 examples include the Multi-species Framework and Artificial Production Review.

**Task 4f. Internet Access.** StreamNet will provide Internet access for information about, and data from, selected FWP projects.

**Task 4g. Historic Policy and Planning Data.** StreamNet will maintain the official version of the Council's Protected Areas dataset and provide online access to these data, systems planning and subbasin data and reports, and other similar materials.

**Objective 5 - Project Management.** *Provide effective leadership that ensures the production of high quality products targeted at critical applications and the development of these products in a timely, cost-effective manner.*

StreamNet spends a relatively small amount of project resources on project management. Project management will be evaluated based on success in delivery of products for each task and ability to meet the project budget.

#### **f. Methods**

In contrast to most FWP projects, which employ scientific methods, StreamNet's methods are primarily technical and managerial. Methods differ by project objective, as follows:

**Objective 1 - Data Development.** StreamNet compiles biological and related data collected by agencies, tribes, and others. All StreamNet data meets accepted scientific standards; sources are referenced and source documents are stored in the StreamNet Library. Data development activities proceed in accordance with the StreamNet data plan, which identifies data that will be targeted over the next few years and the highest priorities for the current year. Data priorities are selected by reviewing FWP data needs and assessing the availability and practicality of securing these data. Adding new data elements to the system typically proceeds in stages, including 1) a scoping process, 2) a test case in one geographic area, 3) development of data exchange standards, and 4) actual compilation. Compilation may proceed system-wide or be staggered depending on data availability, staff availability, and immediacy of need. Increasingly, StreamNet participants are focusing their efforts on smaller geographic areas and using GIS technology as a means to secure and display data.

**Objective 2 - Data Management and Delivery.** Data management involves efforts at both the regional and agency levels. At the regional level StreamNet employs a regional data manager and a GIS specialist. The regional team is responsible for establishing consistent data compilation practices, for incorporating data supplied by participating agencies into the regional dataset, and for managing the StreamNet Internet site and other data delivery mechanisms. At the agency level, a database manager and GIS specialist are typically assigned to facilitate data compilation and transfer of data to the region.

Regional data exchange formats and standards are at the core of the StreamNet data concept. These standards ensure that data providers supply data in a consistent manner, which facilitates creation of a consistent regional product that, in turn, provides opportunities for inter-subbasin comparisons and Basin-wide monitoring and evaluation. StreamNet promotes

use of common data exchange standards by non-FWP data initiatives, both in and out of the Basin. This provides opportunities for cross-program coordination, for example between the FWP and NMFS ESA activities. Data exchange formats are created through an interactive process. Typically a draft format is prepared, tested, evaluated, and revised prior to being made a component of the overall StreamNet data exchange system. StreamNet uses the EPA river reach system as a means to geographically reference data. The reach system offers important analytical capabilities, including upstream-downstream tracking and the ability to query data at various hydrologic scales from a watershed to a subbasin to the entire Basin.

Another important element of StreamNet data management is the StreamNet Internet data delivery system, which includes a sophisticated data query capability ([www.streamnet.org](http://www.streamnet.org), click on online data). All elements of the StreamNet data management system are documented and subjected to extensive review prior to implementation.

**Objective 3 - Library / Reference Services.** The library objective is implemented through subcontract to CRITFC and is overseen by a professional librarian. Collection development proceeds in accordance with an established plan, with highest priority given to gray literature and materials not readily available elsewhere. Cataloging of both StreamNet source documents and other materials is conducted according to an established process that is consistent with accepted library standards. The Library has a written policy concerning public access to and use of materials. Inter-library loans and other services are offered in accordance with accepted library standards.

**Objective 4 - Services to the Fish and Wildlife Program and Related Resource Restoration Activities.** StreamNet provides data and other technical services on the request of CBFWA, NWPPC, and other FWP participants. Priorities are determined in consultation with CBFWA and NWPPC. With regard to analytical services, StreamNet draws a strong distinction between data development and data analysis. In StreamNet, information is viewed as being objective and value neutral. StreamNet only becomes involved in analysis activities when asked to do so, and then only if another entity defines analysis criteria.

**Objective 5 - Project Management.** StreamNet's regional management team ensures that the project is implemented according to the work statement and that data are compiled according to regional standards and integrated into the regional system. The regional team is also responsible for data compilation activities that can be most effectively implemented at the regional level. Participating agencies operate through subcontracts with PSMFC and have responsibility for assembling data from primary sources within their jurisdiction or geographic area. Each participating agency has a coordinator and a project team.

Project decisions are made through a steering committee comprising agency coordinators and BPA's COTR; decisions are made by consensus, and NWPPC, CBFWA and NMFS staff are consulted on a regular basis. Considerable emphasis is given to coordinating with other applicable activities. StreamNet regularly participates in regional data work groups. All subcontractors file quarterly status reports. PSMFC prepares formal status reports. All technical and management reports are posted to StreamNet's web site.

**g. Facilities and equipment**

The principal facilities and equipment required for successful implementation of this project are office work areas and computers and related technical equipment. Each participating agency maintains sufficient office space for project staff; costs for work space are included in agency indirect costs. The StreamNet Library is housed in leased space on the main floor of the office building that also houses the Columbia River Inter-Tribal Fish Commission. This space is strategically located near several federal and state agency offices and is within easy walking distance of public transportation. Its location on the street level next to the main entrance facilitates walk-in business. The library is an appropriate size to both house the collection and provide necessary services.

StreamNet acquired new Internet server hardware and software in FY 97; minor upgrades were made in FY 99 and the system is adequate to meet anticipated project demands. Internet communications are made through a T-1 line shared with other PSMFC projects. Participating agencies have appropriate database, GIS, and word processor equipment and software. Equipment included in the proposed FY 2000 budget includes: 5 desk top computers to replace outdated equipment, memory and hard drive upgrades, select development tools and office software upgrades, and renewal of GIS software licenses.

#### **h. Budget**

The proposed FY 2000 budget of \$1,936,453 represents a 2.8% increase over the actual FY 1999 budget. This covers part but not all of anticipated cost of living increase and agency overhead rate increases. All participating agencies will receive approximately the same percentage of the overall budget in FY 2000 as in FY 1999. While in real dollars the budget is staying constant or decreasing, StreamNet is proposing to assume additional technical service responsibilities to Fish and Wildlife program activities, specifically by providing data and data services in support of CBFWA's objectives #1, 4, 5, and 6 (see Section 3 above). StreamNet will absorb these added tasks through becoming more efficient in compilation of trend data and seeking funds from other sources. Section 5, Budget - Cost Sharing indicates that StreamNet will seek upwards of \$375,000 in funding from in-kind services and other contracts. Please note: 1) these funds are not committed but rather are used for planning purposes, 2) data development undertaken through these contracts (if awarded) will be for complementary activities that are in addition to the activities contemplated under the FWP contract and will not duplicate or replace objectives and tasks outlined in this proposal, and 3) the net effect of securing additional funds will be to maintain the current level of involvement by participating agencies.

Out-year budgets represent annual 2.5% increases to account for normal cost increases. Maintaining constant service levels in out-years will require securing funds from non-FWP sources.

## **Section 9. Key personnel**

StreamNet activities are coordinated by a regional project management team housed at PSMFC and a steering committee made up of project coordinators from each participating agency. For the purposes of this proposal, the members of the steering committee, the project manager, and the regional data manager are considered to be "key personnel." They are listed below. The number in parenthesis represents the number of months allocated to and funded by the StreamNet project.

Douglas Burch, fisheries biologist/data analyst, StreamNet Data Manager (10)  
Bart Butterfield, wildlife biologist/GIS analyst, IDFG coordinator (4)  
Cedric Cooney, marine biologist, ODFW coordinator (12)  
Janet Decker-Hess, fisheries biologist, MFWP coordinator (9)  
Dick O'Connor, fisheries biologist, WDFW coordinator (2)  
Drew Parkin, natural resource planner/policy analyst, StreamNet Project Manager (12)  
Stephen Pastor, fisheries biologist, USFWS coordinator (2)  
Phil Roger, fisheries biologist, CRITFC and member tribes coordinator (3)  
Alan Ruger, fisheries biologist, BPA COTR  
Doug Taki, fisheries biologist, SBT coordinator (3)

Brief resumes of key personnel follow.

**Douglas A. Burch - StreamNet Regional Data Manager**

**Education:**

B.S. Degree, Fisheries Science major, Business Administration minor, Humboldt State University, Arcata, CA, June, 1985. A.S. Degree, Life Sciences, Butte Community College, Chico, CA. June, 1982.

**Current Employer and Responsibilities:**

Pacific States Marine Fisheries Commission, StreamNet Regional Data Manager

**Previous Employment:**

Custom Database Solutions: Consulting  
MS Access Programmer/Developer

CSU Chico Research Foundation, Chico, CA  
GIS Database Manager

California Department of Fish and Game, Redding, CA  
Fish and Wildlife Scientific Aide; Inland Fisheries Division

National Marine Fisheries Service, Long Beach, CA  
Southwest Region, NOAA, D.O.C.; Marine Mammal Observation Branch  
Biological Technician (Fisheries); Tuna/Dolphin Observer

**Expertise:**

Extensive experience in regional data management and spatial data related projects. Development of relational database applications, independently and in cooperation with others. Developed and managed large scale data systems; understanding of database management concepts and methods, including the Structured Query Language (SQL). Provided support to Geographic Information Systems (GIS) staff through a full range of spatial data management tasks, such as preparing data layers for maps and development of database applications with embedded map views. Development of Internet/ Intranet sites.

Developed and implemented the Trak Environmental Monitoring Information System (a multi-agency client/server application that facilitates the exchange of environmental monitoring information between monitors and project managers). Experience in data collection and interagency monitoring projects and in communicating application user needs to system developers. Computer systems administration and supervising computer support technicians.

**Consulting:**

Bass Check Angler Survey Compilation Program, A Microsoft Access data entry program that compiles angler survey information and generates reports; this is a runtime application which includes a Help file system, developed for the California Department of Fish and Game, Reservoir Research Project.

Hatchery Distribution Database, A Microsoft Access data entry program that compiles stocking distribution information and generates reports, developed for Coleman National Fish Hatchery, U.S. Fish and Wildlife Service.

Trak Environmental Monitoring System, A Microsoft Access client/server data entry program that tracks environmental impact activities along construction right-of-ways. Assisted with programming and implementation of the system through a subcontract agreement with Butte Canyon Research Associates.

**Publications/Activities:**

Authored supporting materials for a variety of relational database applications including operational manuals and help system files; drafted supporting documents and provided training and technical support. Also prepared unpublished fisheries reports for the California Department of Fish and Game Wild Trout and Reservoir Research projects.

**BART R. BUTTERFIELD** - StreamNet Steering Committee Member, IDFG Coordinator

**Education:**

University of Idaho, Moscow - M.S. in Wildlife Resources - 1985

Thesis: *Avian Community Development Along a Primary Successional Gradient.*

Western State College of Colorado, Gunnison - B.A. in Biology - 1980

**Current Employer and Responsibilities:**

Idaho Department of Fish and Game

Geographic Information Systems Analyst, Senior - 1992 to Present

Coordination of the Department's GIS program, development of fish and wildlife databases, analytical services, and map development.

**Previous Employment:**

University of Idaho, Moscow. – Research Associate 1990-1992.

Mountain West Ecology, Moscow, ID – Sole Proprietor 1986-1992.

**Expertise:**

Application of GIS and remote sensing technology to natural resource management and research.

**Publications and Technical Reports:**

Groves, C. R., B. Butterfield, A. Lippincott, B. Csuti and J. M. Scott. 1997. Atlas of Idaho's Wildlife: Integrating Gap Analysis and Natural Heritage Information. A. Lippincott, editor. Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, Boise. 372 pp.

Keister, A. R., J. M. Scott, B. Csuti, R. F. Noss, B. Butterfield, K. Sahr, and D. White. 1996. Conservation prioritization using GAP data. *Conservation Biology* 10:1332-1342.

Caicco, S. L., J. M. Scott, B. Butterfield, and B. Csuti. 1995. A gap analysis of the management status of the vegetation of Idaho (U.S.A.). *Conservation Biology* 9:498-511.

Butterfield, B. R., B. Csuti, and J. M. Scott. 1994. Modeling vertebrate distributions for Gap Analysis. Pp. 53-68 in R. I. Miller, editor. *Mapping the Diversity of Nature*. Chapman & Hall, London.

Scott, J. M., F. Davis, B. Csuti, R. Noss, B. Butterfield, C. Groves, H. Anderson, S. Caicco, F. D'Erchia, T. C. Edwards, Jr., J. Ulliman, and R. G. Wright. 1993. Gap analysis: a geographic approach to protection of biological diversity. *Wildlife Monographs* No. 123: 1-41.

Butterfield, B. R. J.M. Scott, and B. Csuti. 1990. Modeling species' distributions and identifying conservation priorities. Pp. 17-22 in *Proceedings: The First National Fish and Wildlife Service Geographic Information System Workshop*. Fort Collins, June 4-7, 1990. U.S. Fish and Wildlife Service, National Ecology Research Center, Fort Collins.

Butterfield, B. R., D. L. Davis, and J. W. Unsworth. 1989. Stratified Landsat classification of north-central Idaho and adjacent Montana. *Proceedings-Land Classifications Based on Vegetation: Applications for Resource Management*. Moscow, Idaho, November 17-19, 1987. USDA Forest Service, General Technical Report INT-257, Intermountain Research Station, Ogden, Utah.

**Activities:**

Member of The Wildlife Society, GIS/RS Working Group of TWS, Biological Diversity Working Group of TWS, The Northwest Section of TWS, and the Idaho Chapter of TWS.

**CEDRIC X. COONEY** - StreamNet Steering Committee Member, ODFW Coordinator

**Education:**

California State University, Long Beach, Bachelor of Science in Marine Biology, 1985

**Current Employer and Responsibilities:**

Oregon Department of Fish and Wildlife  
Oregon StreamNet Project Leader

**Previous Employment:**

Assistant Project Leader, Coastal Salmon Spawner Inventory Project  
Oregon Department of Fish and Wildlife, Corvallis, OR, 1990 - 1997

California Department of Fish and Game, Long Beach, CA  
Marine Biologist Range B, Long Beach, CA, 1987 - 1990

California Department of Fish and Game, Long Beach, CA  
Seasonal Aide, Long Beach, CA, 1985 - 1986

**Expertise:**

- 1) Techniques and methodologies associated with large-scale inventories and assessments of anadromous salmonids,
- 2) Marine artificial reef development and evaluation techniques,
- 3) Techniques and methodologies associated with at-sea inventories and assessments of marine pelagic species,
- 4) Aquatic data development and delivery,
- 5) Project management and coordination.

**Publications/Activities:**

State-level Natural Resource Inventory and Assessment:

Author of the *Oregon coastal salmon spawning surveys* summary reports from 1990 through 1995 which documents and summarizes Oregon coastal salmonid inventory results and analysis. Co-author of this same report in 1997.

Co-author of *Improvement of methods used to estimate the spawning escapement of Oregon Coastal Natural coho salmon* research progress report from 1990 through 1994. This progress report documented an experimental Stratified Random Sampling approach to survey site selection in order to more accurately inventory Oregon coastal natural coho spawning populations.



**JANET DECKER HESS** - StreamNet Steering Committee Member, MFWP Coordinator

**Education:**

University of Montana, Master of Science in Fisheries Biology, 1978

Thesis: *Impact on the Aquatic Ecosystem by Mining in the Mike Horse Area, Heddleston Mining District, Lewis and Clark County, MT*

Ohio University, Bachelor of Science, 1974

**Current Employer and Responsibilities:**

1985 - present

Montana Fish, Wildlife and Parks (MFWP), Kalispell, Montana

Fisheries Biologist and Project Manager for StreamNet in Montana and Coordinator for the MFWP GIS Services Unit - Responsible for gathering, compiling, and maintaining fisheries and wildlife information, providing GIS services to the department, and supervising a staff of 5

**Previous Employment:**

1986, Yellowstone National Park, Gardiner, Montana

A Biological Study and Instream Flow Assessment of Soda Butte Creek, LaMar Valley, Yellowstone National Park

1981- 1985, Montana Fish, Wildlife and Parks, Kalispell, Montana

Project Manager and Fisheries Biologist - Impacts of Kerr Dam on the shoreline spawning population of Kokanee Salmon in Flathead Lake

1985, American Fisheries Society, Bethesda, Maryland

An Inventory of the Spring Creeks in Montana

1979- 1981, Montana Fish, Wildlife and Parks, Dillon, Montana

Fisheries Biologist, Assessment of instream flow reservations and fisheries populations in selected waterways, of the Beaverhead, Big Hole and Red Rock drainages of southwest Montana

1978-1979, University of Montana, Missoula, Montana

Instructor, Biological Applications in Water Pollution

1976-1978, University of Montana, Missoula, Montana

Research Assistant, The effects of pollutants and heavy metals on algae development

**Expertise:**

1) Biological assessment and classification of aquatic resources, 2) Management, development and delivery of multi-disciplinary and multi-platform natural resource databases, 3) River protection and management, 4) Administration of multi-task, multi-staff operation

**Publications/Activities:**

Officer Montana Chapter American Fisheries Society, 1981-83.

President Montana Chapter American Fisheries Society, 1983-85.

1993 Award for Outstanding Achievement in the Management of Natural Resources, *Western Conservation Administrative Offices Association*.

Decker-Hess, J. and P. Clancey . 1982, 1983, and 1984. *Impacts of Water Level Fluctuations on Kokanee Reproduction in Flathead Lake*. MFWP, Kalispell, MT. 58 pp.

Decker-Hess, J. 1987. Spring Creeks-Precious Secrets. *Montana Outdoors*, 18(3), 2-6.

Decker-Hess, J., G. Bissell, S. Allen, T. Ring, N. Johnson, and S. Reel. 1988. *Pacific Northwest Rivers Study: Final Report. Montana*. 190 pp.

Decker-Hess, J. 1990. River Protection in Montana, MFWP, Helena, MT. 65 pp.

Fraley, J. and J. Decker-Hess 1987. Effects of Stream and Lake Regulation on Reproductive Success of Kokanee in the Flathead River system, MT, USA. *Regulated Rivers: Research and Management*, 1, 257-265.

Fraley, J., B. Marotz, J. Decker-Hess, W. Beattie, and R. Zubik. 1989. Mitigation, Compensation and Future protection for fish Populations Affected by Hydropower Development in the upper Columbia System, Montana, USA. *Regulated Rivers: Research and Management*, 3, 3-18.

**RICHARD J. (DICK) O’CONNOR** - StreamNet Steering Committee Member, WDFW Coordinator

**Education:**

University of Washington, Master of Science in Fisheries Population Dynamics, 1977

Thesis: *Ocean Growth, Mortality, and Maturity of Columbia River Fall Chinook Salmon*

Ripon College, Bachelor of Arts in Mathematics and Science; Secondary School Teaching Certification, 1975

**Current Employer and Responsibilities:**

Washington Department of Fish and Wildlife (1977-present)

Manager, Fish Resource Data and Systems

**Expertise:**

1) Salmonid stock management techniques and issues; 2) Database design, construction and maintenance; 3) Computer program design, construction, and maintenance; 4) Computer hardware and software troubleshooting and repair; 5) Project management; 6) Staff supervision

**Publications/Activities:**

Data systems development. 15 years experience assessing user needs, designing, constructing, testing, and deploying computer systems for professional fish managers in WDFW.

Database development: 20 years experience assessing user needs, designing, constructing, and maintaining datasets and database systems for professional fish managers in WDFW.

Region-wide data sharing projects: 15 years experience developing fish data exchange formats and common systems for West Coast states and British Columbia through the PMFC/PSMFC Committee on Anadromous Fish Marking and Tagging, the Pacific Salmon Commission Data Sharing Committee’s Standing Work Group on Data Standards, and the Northwest Power Planning Council’s StreamNet Project.

**DREW O. PARKIN** - StreamNet Regional Project Manager

**Education:**

University of New Mexico, Master of Community and Regional Planning, 1986

Thesis: *The Design of Natural Resource Policy: The Maine Rivers Study*

University of Utah, Bachelor of Science in Political Science, 1970

**Current Employer and Responsibilities:**

Pacific States Marine Fisheries Commission, StreamNet project manager

**Previous Employment:**

Chief, Division of Rivers and Special Studies

National Park Service, Boston, MA, 1992 - 1995

Partner, Natural Resource Consulting Firm

Land and Water Associates of Maine, Hallowell, ME and Cambridge, MA, 1984 - 1992

Natural Resource Policy Analyst

State of Maine, Augusta, ME, 1981 - 1983

Forestry Technician, Recreation Supervisor

US Forest Service, Logan, UT, 1975 - 1980

**Expertise:**

1) Techniques and methodologies associated with large-scale river resource inventories and assessments, 2) NWPPC Fish and Wildlife Program policies and procedures, 3) Federal and state aquatic resource management laws and policies, 4) Fish and wildlife issues and policies, 5) Aquatic data development and delivery, 6) Project management and coordination.

**Publications/Activities:**

State-level Natural Resource Protection Policy. Author of the *Maine Rivers Protection Act of 1983*, the nation's first comprehensive, state-wide rivers protection act. Among other things, the Act protected Maine's salmon run rivers from instream and shorelands development. Author of the *Maine Lake Shoreland Protection Policy*, which established shorelands protection zones on over 1,000 lakes and ponds.

Hydropower Policy. Leading role in establishing comprehensive hydropower plans and state use of 401 water quality certification to protect aquatic resources from inappropriate development. Author of the *Maine Comprehensive Hydropower Development and Resource Protection Plan*, the nation's first state-wide hydropower plan. Principal consultant to the *State of Washington Hydropower Plan*. Significant role in the design of the *NWPPC Protected Areas Policy*. Author of the *National Park Service Hydropower Mitigation Policy*.

Federal Water Resource Project Mitigation. Author of Federal Register rules that direct how the Utah Reclamation Mitigation and Conservation Commission allocates federal funds (\$20,000,000 annually) to mitigate for the Central Utah Project and the Colorado River System projects. Author of Federal Register rules that govern NEPA review procedures related to use of these funds.

State and Regional Aquatic Resource Inventory and Assessment. Coordinator of the Pacific Northwest Rivers Study (1986). Coordinator of statewide river inventories in Maine, Vermont, and New Hampshire. Consultant to similar state-wide projects in Arizona, California, Hawaii, South Carolina, and Tennessee.

Wild and Scenic Rivers. Principal developer of the National Park Service's private lands W&S River policies and procedures. Coordinated studies and designation of 7 wild and scenic rivers and contributor to several others. Major contributor to the designation of Oregon's Klamath River as a W&S River.

**PHILLIP B. ROGER** - Steering Committee Member, CRITFC and Member Tribes Coordinator

**Education:**

University of Washington, Ph.D. Candidate, emphasis in ecological modeling, 1976  
University of Washington, M.S. Fisheries, emphasis in population dynamics, 1971  
University of Washington, B.S. Fisheries, minors in mathematics and chemistry, 1968

**Current Employer and Responsibilities:**

Columbia River Inter-Tribal Fish Commission, 1980 - present  
Manager, Fisheries Science Department

**Previous Employment:**

Quinault Indian Nation, Taholah, WA, 1975-1980  
Biometrician, Harvest Manager

University of Washington, Seattle, WA, 1971 - 1975  
Fisheries Biologist, Project Leader

**Expertise:**

1) Devising and evaluating strategies for salmon restoration, 2) Information management, 3) Pacific Northwest salmon policy issues, 4) Fishery harvest management.

**Publications/Activities:**

Salmon Restoration Issues:

Lead Author: *Wy-Kan-Ush-Mi Wa-Kish-Wit*, Chapter 5; *Multi-year Implementation Plan for the Protection, Restoration, and Enhancement of Columbia River Basin Fish and Wildlife Resources*, Section 5.5; *Draft FY 1998 Annual Implementation Work Plan*, Appendix A.

Co-author: *An Annotated Compendium of Spawning Ground Surveys in the Columbia River Basin Above Bonneville Dam*, 1960 - 1984; *Observations on the Accuracy of Redd Counting Techniques Used in the Columbia Basin*.

Information Management:

1) Designed and created the "Bristol Bay Database" containing all available information on freshwater production of sockeye salmon in the Kvichak River system, Alaska, 2) Designed and implemented a realtime data acquisition and analysis system for Quinault fishery management, 3) Designed, acquired, and implemented a VAX/PC computer system for 50 users, 4) Coordinated Information System (now StreamNet) project manager.

Pacific Northwest Salmon Policy Issues:

1) Member, Northwest Power Planning Council Monitoring and Evaluation Group - a team responsible for evaluating the effectiveness of efforts to restore salmon runs in the Columbia Basin, 2) Member, Northwest Power Planning Council Genetics Workshop Steering Committee, 3) Expert witness in the U.S. v. Washington and U.S. v. Oregon treaty fishing rights cases.

Harvest Management:

1) Member, North Pacific Fishery Management Council Salmon Plan Development Team, 2) Technical advisor to the U.S. delegation, Pacific Salmon Treaty negotiations, 3) Member of the four-person international team that developed the first coast-wide ocean harvest model for chinook salmon.

**DOUG TAKI** - StreamNet Steering Committee Member, Shoshone-Bannock Coordinator

**Education:**

Idaho State University, B.S. in Biology with emphasis in fish ecology

**Current Employer and Responsibilities:**

Shoshone-Bannock Tribes, Fort Hall, 1993 - present  
Sockeye Research Program Manager

**Previous Position:**

Resident Fisheries Manager  
Shoshone-Bannock Tribes, Fort Hall, ID, 1991 - 1993

**Expertise:**

1) Techniques and methodologies for evaluating stream and riparian habitats, 2) Techniques and methodologies for evaluating lentic habitats, 3) Fish sampling techniques (e.g. screw traps, weir operations, gill nets, electrofishers, etc.) and subsequent evaluations, 4) All phases of using PIT tags for evaluating migration performance of anadromous fish, 5) All phases of conducting and analyzing hydroacoustic surveys, 6) Statistics including biometry, 7) SCUBA certified.

**Publications:**

6 annual reports for Bonneville Power Administration-administered Fish and Wildlife Program projects.  
4 annual reports for Bureau of Indian Affairs fish management projects.  
2 annual reports for Idaho Department of Fish and Game fish management projects.

**Activities:**

Responsible for all aspects of the Shoshone-Bannock Tribes (SBT) Snake River sockeye research project. Specific responsibilities include: 1) staff supervision (one biologist, one full-time and one temporary technician, and a limnology subcontractor), 2) coordinating field work with the IDFG, 3) conducting all hydroacoustic analyses and PIT tag evaluations, 4) contract management (writing annual Statement's of Work and itemized budgets, tracking expenditures, ensuring completion of tasks, monitoring subcontractor performance, and preparing annual reports to the Bonneville Power Administration), and 5) coordination between this project and related activities.

Liaison between Tribal government and the IDFG, NMFS, BPA, IDEQ, and USFS for all sockeye-related management and research related issues. Represent the SBT on the Stanley Basin Technical Oversight Committee and share responsibility on the Fish Passage Advisory Committee and Anadromous Fish Managers forum.

StreamNet Steering Committee member since 1996. Responsibilities include coordinating data transfer and other activities between the Shoshone-Bannock Tribes and regional data development activities, evaluation of web site enhancements, coordination of genetics data development activities including interactions with researchers, participation in project oversight and guidance.

In prior position, was responsible for managing the fisheries resources on the 544,000 acre Fort Hall Indian Reservation.

## **Section 10. Information/technology transfer**

## **Data Delivery Mechanisms**

The principal means employed by StreamNet to transfer information are: 1) the Internet, 2) the StreamNet Library, and 3) reports and custom products. These are discussed in order.

**Internet.** StreamNet has made a considerable investment in developing a state-of-the-art Internet data delivery system. (See [www.streamnet.org](http://www.streamnet.org).) The key component of the StreamNet Internet site is a flexible and user-friendly data query system that allows Internet users to access data, maps, and library references. All StreamNet datasets are readily available through this system. The system offers a variety of ways to query data that respond to a variety of user needs. Queries may be made at a broad range of geographic scales including individual stream segments, watersheds, subbasins, subregion, and the entire Columbia Basin, as well as administrative jurisdictions. The query system also provides access to StreamNet library holdings. Users may use the query system to create maps, charts, and graphs. Links are provided between data and bibliographic references. A variety of view and download options are also available.

The StreamNet web site also contains a range of other features including fish and wildlife-related links, a glossary, a fish species database, several Fish and Wildlife Program documents and datasets, and a variety of educational features suitable for the general public. While many features are designed to be readily accessible by novice Internet users, some features, such as the 100K River Reach File and anadromous trend data focus on a more limited, technical audience. StreamNet also maintains a “project management” feature that provides an effective means to distribute information among the several organizations involved in the project. Archive versions of the StreamNet dataset are maintained. These provide a historical context for StreamNet data and are of particular value to researchers who wish to reference a specific version of the database in publications and to those who need to provide exact citations for policy or legal purposes.

**StreamNet Library.** The StreamNet Library focuses exclusively on Columbia Basin fish issues and offers a full range of library services geared to the needs of resource managers and decision-makers. The Library’s core mission is to provide access to the source materials from which StreamNet data derive, including hard to obtain “gray literature.” The Library also maintains a large collection of other documents related to the Columbia Basin and fish resources. The Library is equipped to provide timely and flexible access to these materials through on-site visits, inter-library loan, custom request, or, increasingly, via online documents and references. The Library offers the potential for providing access to a much broader range of FWP-related reports and literature. The reader will note that the ISG has expressed concern that FWP-generated research is not being made available in a timely fashion and that this hampers the region’s ability to implement adaptive management strategies (ISG, 1996, p. 430). The Library is in a strategic position to respond to this concern. To do so will require establishment of necessary protocol by BPA, CBFWA, and NWPPC.

**Custom Products.** StreamNet participants prepare a variety of special purpose data and electronic map products. Both tabular data and GIS products are delivered via ftp, the StreamNet Internet site, on disk or CD-ROM, or as paper reports or maps.

StreamNet participants also prepare a variety of technical papers and documentation related to data development, data management, and electronic data delivery. These are principally of interest to project participants and others involved in FWP coordination or related data activities. These products are available in "hard copy" and via the StreamNet home page where reports are posted for viewing and download in formats that meet the needs of a variety of users. The project maintains a frequently updated project brochure, computer presentations, and other materials that inform the public about the project. These are made available via the StreamNet home page, the StreamNet Library, and other forms of public distribution.

### **ISRP Questions Related to Information Transfer**

In its July 1998 review of the FWP, the ISRP identified several questions related to information dissemination (V-D.3.b). StreamNet responses are as follows:

**Communication with the Public.** StreamNet seeks to provide access to data that are directly applicable to a wide range of Columbia Basin fish and wildlife activities. Resource managers and decision makers are the primary clients, though features are also provided that have educational value to the general public. Data are updated regularly, with an objective of adding the most recent anadromous fish trend data on an annual basis and other data as these become available or as situations change. A "what's new" feature provides users with up-to-date guidance on data and features that have been added to the site. The StreamNet web site provides options to view data online or to download in database or ASCII formats. StreamNet documents are provided in html, pdf, and word processor download formats. Online help is provided. Help is also provided through the web site's feedback mechanism. It is project policy to respond to all inquiries within 24 hours and to follow up to ensure user satisfaction.

**Quality Control.** Control over the quality of StreamNet data is accomplished through 1) adherence to predetermined, interagency data exchange standards, 2) verification by appropriate agencies prior to delivery, 3) referencing of all StreamNet data to source materials, and 4) technical data management system controls. Perhaps the most important means to ensure quality is to encourage use of the site and feedback by the user community. All user comments regarding data accuracy are investigated. When suspected errors are located, these are discussed with the agency that originally submitted the data and changes are made as appropriate.

**Assessing Demand.** StreamNet's predecessor project (CIS) conducted a detailed user needs survey. The results of that survey were published in a BPA/FWP document available through the Streamnet Library. StreamNet managers closely monitor regional guidance documents (AIWP recommendations, Biological Opinions, ISRP/ISAB reviews, etc.) and maintain a log of data issues raised in these documents. Managers also participate in a variety of on-going FWP and ESA activities in order to both provide data services and identify emerging data needs. StreamNet steering committee members are charged with monitoring data needs within their respective agencies and communicating findings to the full committee. Once identified, data needs are compiled in the StreamNet data plan, which serves as the primary source for development of annual data development work plans.

**Use.** Over the past year the StreamNet web site received 30,000 visits ("sessions" as opposed to "hits"), averaging between 2,500 and 3,500 per month. The site is predominantly used as a professional management tool, as witnessed by the fact that most of the use takes place during the work week and during working hours. From statistics and communications with users it can be inferred that the site is predominantly used for resource planning and management, research (both academic and FWP-related), impact analysis, policy, and education. The majority of users access the system through commercial Internet providers, making it difficult to determine origination. The site also receives significant use from educational institutions, federal and state government agencies, and private organizations involved in resource management and advocacy. In one recent month the site was visited by users from over 50 universities; Oregon State University was the top user, followed by the University of Washington.

Among government agencies NWPPC and BPA are the most frequent users. Other federal agencies with significant use include NMFS, EPA, USFS, and BLM. State use comes principally from Idaho, Oregon, and Washington fish and wildlife, water resource, and transportation agencies. These state agencies each make between 100 and 300 online requests per month. Foreign use comes principally from Canada, and within Canada, principally from British Columbia.

Use of the site by private organizations is extensive and no one group stands out as a primary user. The site was visited by over 100 different non-governmental organizations during the past year. Private use is primarily from the Pacific Northwest region, though there is use from every section of the country and throughout the world.

Within the StreamNet site the principal use area is the query system. Within the query system the highest demand is for GIS maps. In addition to the Internet, StreamNet participants typically respond to approximately 2,000 data requests annually.

**Outcomes.** StreamNet participants seek to achieve the following outcomes as a result of the project's data delivery initiatives: 1) Users will view information and management issues from a more comprehensive perspective, 2) Users will appreciate the value in the development of cooperative, multi-use data, and become involved in data sharing activities, 3) Users will consult readily available information sources such as StreamNet prior to embarking on major data development initiatives and use information from these sources to supplement their efforts, 4) Decisions will be made using data as a key component of the decision process, and 5) Cost savings will be realized through efficient and effective use of existing data. In addition, the general public will be better informed about Columbia Basin resource restoration issues and outcomes.

**Assessing Impact.** The impact of information will be assessed through 1) monitoring user satisfaction, 2) monitoring demand for services, and 3) monitoring use in the decision process by CBFWA, BPA, NWPPC, tribes, and federal and state resource agencies

**Connection to the Fish and Wildlife Program.** StreamNet managers have as their highest objective the creation and delivery of data that are directly applicable to FWP policy, planning, and management activities. StreamNet maintains a matrix that tracks the correlation between StreamNet objectives and tasks and regional planning and decision documents. This correlation may be viewed at [www.streamnet.org/2000](http://www.streamnet.org/2000).



**Congratulations!**